

SBI3U - Evolution		Grade 11
<i>Lesson Sequence</i>	<i>Lesson Plan Title (Concept)</i>	<i>Names</i>
First Lesson	Introduction to Evolution: "A Brief History of Time... On Earth"	Mike Carlson and Erin Woods
Second Lesson	Darwin and the Theory of Evolution	Sandeep Benin and Jasmine Chong
<p><i>Rationale:</i> The first lesson is the overall introduction to the unit. It would be delivered on the first day of the Evolution unit. The second lesson would be delivered directly following, and is an introduction into the theory of evolution.</p> <p>First Lesson</p> <p>The first lesson is a glimpse into the Big Idea that: <i>Evolution is the process of biological change over time based on the relationships between species and the environment.</i> The lesson progresses to investigating biological change and it's relationship with continental drift. It is also supportive of the Big Idea that: <i>Evolution theory is a scientific explanation based on evidence.</i> The lesson discusses recent changes to the origins of life and provides evidence of early evolution through images and video.</p> <p>The Learning Goals for the first lesson are:</p> <ol style="list-style-type: none"> 1. Students will develop a concept of relative time on earth and be able to place organisms on a timeline for when they first appeared on earth. This learning goal is based on the supportive evidence that has been discovered regarding evolution theory. 2. Students will be able to explain the processes that lead to the first self replicating RNA, eukaryotes and sexual selection. This learning goal relates to biological change over time and delves into the relationships between species and environment. 3. Students will be able to discuss the changing earth over time and its relation to the idea of evolution. This learning goal relates to the relationships between species and environment. <p>Second Lesson</p> <p>The second lesson introduces the students to the Big Idea that: <i>The theory of evolution is a scientific explanation based on a large accumulation of evidence.</i> The lesson progresses with the historical developments that led to Darwin's observation and proposition of natural selection. Through the use of class activities, discussion and computer simulations, students will have a greater understanding of Darwin's theory of evolution and the scientific method.</p> <p>The Learning Goals for the second lesson are:</p> <ol style="list-style-type: none"> 1. To understand the theories leading up to Darwin's theory of evolution. 2. To deduce how Darwin developed his theory. 3. To introduce the theory of evolution. 		

Evolution Unit Plan

Day 1 Introduction: History of Evolution	Day 2 Darwin and the Theory of Evolution	Day 3 Natural Selection	Day 4 Genetic Variation Genetic Drift	Day 5 Sexual Selection Artificial Selection
Day 6 Computer Lab Simulation	Day 7 Quiz #1 & Speciation	Day 8 Adaptation	Day 9 Lab: Looking at Fossils	Day 10 Environment stresses and changes
Day 11 Genetically Modified Foods	Day 12 Diseases and Antibiotic Resistance	Day 13 Debate Prep/Practice	Day 14 Quiz#2 Debate Prep/Practice	Day 15 Debate
Day 16 Debate	Day 17 Review	Day 18 Summative Assessment		

Unit and Title of Lesson: Grade 11 Biology – Evolution (Day 1) “A Brief History of Time... on Earth”			
Curriculum Connections Big Ideas - Evolution is the process of biological change over time based on the relationships between species and the environment. - Evolution theory is a scientific explanation based on evidence. Ministry Expectations - Overall Expectations <i>C2 - Investigate evolutionary processes, and analyze scientific evidence that supports the theory of evolution</i> Ministry Expectations - Specific Expectations <i>C2.1 - Students will use appropriate terminology related to evolution.</i> <i>C2.2 - Students will use a research process to investigate some of the key factors that affect the evolutionary process.</i> Learning Goals 1. By the end of today students will have developed a concept of relative time on earth and be able to place organisms on a timeline for when they first appeared on earth. 2. By the end of today students will be able to explain the processes that lead to the first self replicating RNA, eukaryotes and sexual selection. 3. By the end of today students will be able to discuss the changing earth over time and its relation to the idea of evolution. Prior Knowledge From Gr. 11 (previous unit) - All living things can be classified according to their anatomical and physiological characteristics, following the principles of taxonomy and phylogeny. - Human activities affect the diversity of living things in ecosystems. From Gr. 10 - An understanding of cell division, cell specialization, organs in animals and plants. - An understanding of the hierarchical organization of cells, from tissues, to organs, to systems. From Gr. 9 - An understanding of the dynamic nature of ecosystems, particularly in terms of ecological balance and the impact of human activity on the sustainability of terrestrial and aquatic ecosystems.		Materials <input type="checkbox"/> Computer/projector <input type="checkbox"/> Video/internet <input type="checkbox"/> String <input type="checkbox"/> Clothes pins <input type="checkbox"/> Pictures for Timeline <input type="checkbox"/> Textbooks <input type="checkbox"/> Video Worksheets	Include in Appendix <input type="checkbox"/> Chalkboard Plan A-1 <input type="checkbox"/> Video Worksheets A-2 <input type="checkbox"/> Teacher Answers A-3 <input type="checkbox"/> Timeline Teacher Answers A-4 <input type="checkbox"/> Printouts for Timeline A-5
Time: 15 minutes Before: Minds On Activate Prior Knowledge: Have students record everything they know about evolution for 3 minutes. (Will be collected.) Think-Pair-Share: Students discuss what they had remembered with a partner and then share with the entire class. Call on each group to discuss one idea they had. (Collect papers with names.) In order to explore evolution, we must first conceptualize time. Key Questions - How old is the universe? Earth? Life? Humans? Introduction of Topic: Create a timeline of Earth with string line secured in the classroom. Have students place events and organisms on the timeline.	Rationale for choice of T/L Strategy: <ul style="list-style-type: none"> • Assesses prior knowledge and readiness • Allows gradual recall of information • Allows peers to share basic understanding • Make connections between prior knowledge and new knowledge that is to be learned • Clarify the Action/Task 		Assessment Strategies: Collect prior knowledge papers as a Formative Assessment to assess prior knowledge of topic.

Evolution (Day 1) “A Brief History of Time... on Earth” Lesson Plan continued...

Time: 45 minutes	<p>Small Group Discussion: <i>Key Question</i> - How long is 1 mm of string in years? – Discuss estimation method first with class. – Have students break into groups and estimate. – Discuss as a class what the results were. <i>Key Question</i> - How long would 80 years (or a human lifetime) be on the string?</p> <p>Whole Class Video (and individual Video Worksheet): http://www.ebaumsworld.com/video/watch/735440/ – Debrief and take up worksheet</p> <p>During: New Concept Small Group Presentations: Groups will represent the origin of either: small organic molecules, eukaryotic cells, or sexual selection, using two different mediums (Choose from: written summary, picture, skit, or abstract representation) - Students can refer to the textbook for information on their topic. - Each group will present what they have created to the class.</p> <p>Whole Class Discussion: Choose student volunteers to read out of textbook on “Continental Drift”. Have students write and add stages of continental drift to timeline string.</p>	<p>Rationale for choice of T/L Strategies:</p> <ul style="list-style-type: none"> • Allow students to communicate and discuss • Allows students to practice estimating • Allow students to support each other • Allows further concept refining of the timeline of earth • Allow students to construct new knowledge • Allow students to develop concepts using higher order thinking skills • Allow teacher time to interact with students, differentiate and assess for learning • Allow teacher to identify and challenge student misconceptions 	<p>Assessment Strategies: Assessment as learning during observation of student group discussions and presentations. Assessment for learning to be done on Home –fun assignments the next day. **Note: all assessments are Formative Assessments as this is a first introduction to the topic of Evolution.</p> <p>Differentiated Instruction: Allow students to choose their own medium for presentations. Use visual and verbal communication. Allow students to choose their own home-fun question.</p>
Time: 10 minutes	<p>Whole Class Discussion: - Ask students “What did we learn today?” – Brainstorm with class on chalkboard Review Learning Objectives – Ask students “Did we accomplish these?” (Thumbs up/down)</p> <p>After: Consolidation & Connection</p>	<p>Rationale for choice of T/L Strategy:</p> <ul style="list-style-type: none"> • To allow students to recall and review learning highlights to increase retention • To assess for learning for Next Steps • Assessment as learning to ensure Learning Goals have been achieved 	
Time: 5 minutes	<p>Home-fun (and remainder of class): - Students will summarize the explanation of continental drift from the textbook into one sentence, and how it connects to evolution. Tomorrow three students will be chosen randomly to present. and - Students will complete five questions from textbook, Chapter 9: ‘Origins of Life’ (student choice).</p> <p>Next Steps</p>	<p>Rationale for Choice of T/L Strategy:</p> <ul style="list-style-type: none"> • To assess for learning for Next Steps • Assessment as learning and reflect on learning • To allow students to practice summarizing information 	

Appendix A-1: Chalkboard Plan

Agenda:

Refresher on Evolution

Timeline on a String!

Group Discussion on Timeline

Video-Fun!

Origins Creations and Presentations

Continental Drift

Small Group Presentations:

Groups 1 – 3: Small Organic Molecules

Groups 4 – 6: Eukaryote Cells

Groups 7 – 8: Sexual Selection

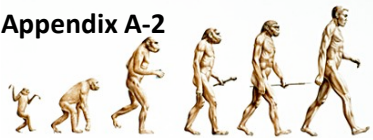
Choose from: written summary, picture, skit, or abstract representation

You will have: 15 minutes.

“What Did We Learn Today?”

Brainstorm on board with class.

Appendix A-2



Name: _____

Student Video Worksheet - The beginning of life on earth

1. What found a home inside the protective tiny enclosed spherical shell formed by molecules with one side attracted to water and one side repelled by water?

2. What are two formations that the amoeba-like bacteria evolved into?

_____ and _____

3. Why were the tentacles formed on the polyp?

4. What did filter feeders develop 550 million years ago?

5. What were our ancestors like 500 million years ago?

6. Approximately how many years ago did amphibians develop legs to walk on land?

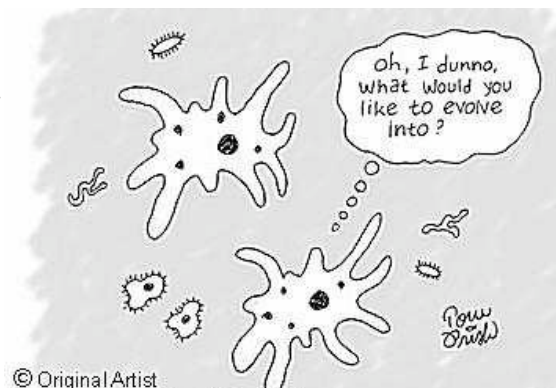
7. Why were hard-shelled eggs better for amphibians?

8. Today, what are the only living descendants of the dinosaurs?

9. What happened 65 million years ago?

10. What are the closest relatives to humans?

11. How old is the 'tree of evolution'?



Appendix A-3













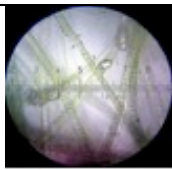
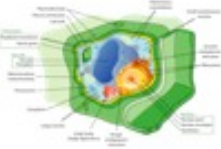
Video Worksheet (Teacher Answers)

The beginning of life on earth

1. What found a home inside the protective tiny enclosed spherical shell formed by molecules with one side attracted to water and one side repelled by water?
DNA
2. What are two formations that the amoeba-like bacteria took?
Plants and colonies becoming a polyp
3. Why were the tentacles formed on the polyp?
To help direct food
4. What did filter feeders develop 550 million years ago?
Gill slits to strain food from water
5. What were our ancestors like 500 million years ago?
Jawless filter feeding fish like lampreys
6. Approximately how many years ago did amphibians develop legs to walk on land?
400 million years ago
7. Why were hard-shelled eggs better for amphibians?
They were hard and could be laid on land – away from predators
8. Today what are the only living descendants of the dinosaurs?
The birds
9. What happened 65 million years ago?
The dinosaurs disappeared
10. What are the closest relatives to humans?
Apes
11. How old is the 'tree of evolution'?
4 billion years.

Appendix A-4

Timeline (Teacher Answers)

	Sea turtles 300 Million years ago		Prokaryotes 3.9 BILLION years ago
	Qin Shi Huang 2,270 years ago		Wattieza 360 million years ago
	Dinosaurs 225 million years ago		Insects 360 million years ago
	Comb Jellyfish 550 million years ago		Elephant 2000 years ago
	Neanderthals 350,000 years ago		Woolly Mammoth 200 million years ago
	Mollusks 500 million years ago		Fish with teeth 400 million years ago
	Cyanobacteria 2.4 BILLION years ago		Eukaryotes 1.5 BILLION years ago

Appendix A-5

Printouts for Timeline String

